The California Water Resources Research and Applications Center

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RESEARCH OBJECTIVES

The California Water Resources Research and Applications Center is a NASA-sponsored center designed around a set of integrated activities focusing on California water resources and related impacts. The objectives are to advance our understanding of California hydroclimate variability and change. Core projects include building research partnerships that focus on analysis and educational outreach of hydroclimate impacts on natural systems, society, and infrastructure.

APPROACH

The Center uses dynamical and statistical downscaling schemes within our Regional Climate System Model framework. We produce hydroclimate simulations at short-term, seasonal, and long-term time scales for weather and river flow forecasts, climate change analyses, uncertainty estimates, landslide modeling, water quality monitoring, and climate change assessments of water resources, agriculture, and natural hazards.

Our applications projects include:

- Runoff contaminant monitoring and real-time water-quality monitoring in the San Joaquin Basin
- Contaminant identification and monitoring from Sierra Foothills mine sites
- Development of a dynamic sediment transport and landslide hazards prediction system
- Snow cover area and water equivalent for California using remotely sensed data and model assimilation
- Geostatistical uncertainty analysis of precipitation and streamflow simulations
- Contributions to impact assessment reports

ACCOMPLISHMENTS

Our Center became a member of the Earth Science Information Partnership, providing value-added climate, weather, streamflow, and impact information to the broad user community, the U.S. National Assessment, and the Intergovernmental Panel on Climate Change reports. We have completed a series of seasonal and multiyear regional climate and streamflow simulations, developed a new statistical downscaling technique for estimating the limits of uncertainty (Kyriakidis et al., 2003), and have used our results as input to the applications listed above. Recent analysis of projected climate and streamflow analysis has been published (Kim et al., 2002) and received national media coverage.

SIGNIFICANCE OF FINDINGS

The climate change and streamflow analyses indicate that the likelihood of extreme weather events will increase, and that night-time temperature will increase at a faster rate than the daytime temperature. An important finding is that warm-wet and cool-dry future climate projections both indicate a 50% decrease in snowpack toward the end of this century. Based on our accomplishments, we received new support from the California Energy Commission, CALFED, and DOE, The California Water Resources Research and Applications Center has become a voice in California climate change assessments, increasing the awareness of potential water resource problems in California and the United States.

RELATED PUBLICATIONS

Brekke, L.D., N.L. Miller, N.W.T. Quinn, and J.D. Dracup, Climate change impacts uncertainty for San Joaquin River Basin. LBNL-51393, 2003. J. American Water Resources Assoc., 2003 (in press).

Casadei, M., W.E. Dietrich, and N.L. Miller, Testing a model for predicting the timing and location of debris flow initiation in soil mantled landscape. Earth Surface Processes, 2003 (in press).

Kim, J., T. Kim, R. Arritt, and N.L. Miller, Impacts of increased atmospheric CO_2 on the hydroclimate of the western United States. J. Climate, 15, 1926–1942, 2002.

Kyriakidis, N.L. Miller, and J. Kim, A spatial time series framework for modeling daily precipitation at regional scales. Journal of Hydrology, 2003 (in press).

ACKNOWLEDGMENTS

Support is provided by the NASA Regional Earth Science Applications Center Program under Grant NS-2791. Work for the Director, Office of Science, Office of Biological and Environmental Research, is under Department of Energy Contract No. DE-AC03-76SF00098.